

# DarsGo system

Electronic tolling system in free traffic flow



# DARS



DARS d.d.  
Motorway Company in the  
Republic of Slovenia

# DARS d.d. - Motorway Company in the Republic of Slovenia



- DARS d.d. is the sole motorway Concessionaire, a joint stock company, established by law and 100% owned by the Republic of Slovenia.
- Main areas of operation:
  - Tolling
  - Maintenance
  - Road Management
  - Investments and reconstruction
- The toll is paid directly to the Concessionaire.
- Based on DARS proposals the Government determines toll tariffs.
- Legal documents regulating tolling: <https://www.darsgo.si/portal/en/legislation>

# Time Related Tolling for Vehicles < 3.5 T

- Vignette system for vehicles (personal cars, vans, etc.) weighing up to 3500 kg
- After the introduction of the vignette on 1 July 2008, more drivers have started to use the motorway network.
- It has positively affected road safety, the CO<sub>2</sub> emissions and the amount of traffic congestions



## One-track motor vehicles



## Caravans and two-track motor vehicles

Caravans and two-track motor vehicles whose height above the front axle is up to 1.30 m, and whose maximum permissible weight does not exceed 3,500 kg, with or without a trailer.



## Two-track motor vehicles

Two-track motor vehicles whose height above the front axle is 1.30 m or more, and whose maximum permissible weight exceeds 3,500 kg, with or without a trailer.

# DarsGo Tolling System for Vehicles >3.5 T



- Electronic tolling system in multilane free flow DSRC System for vehicles weighing over 3.5 tons
- Brand Name: **DarsGo**



# DarsGo System



- Open Tolling System
- Multi-Lane Free Flow
- Motorway Network:
  - Entire Slovenian Motorway Network - 623 km
  - One tolling Gantry in each section of the Slovenian motorway network
  - 128 Sections/gantries (15 out of them enforcement gantries)
- Mandatory use of an on board unit (DarsGo Unit)
- DSRC CEN TC 278 Tolling System, compliant with Directive 2004/52/EC according to EN15509
- Tolloed Vehicles: vehicles > 3.5 T maximum permissible weight
- Vehicles exempt from tolls:
  - priority vehicles, escort vehicles, and vehicles in escort;
  - military vehicles
  - vehicles of the toll road operator for performing maintenance tasks
  - vehicles for performing humanitarian aid tasks

# DarsGo System

- **DarsGo system consists of 5 main subsystems:**

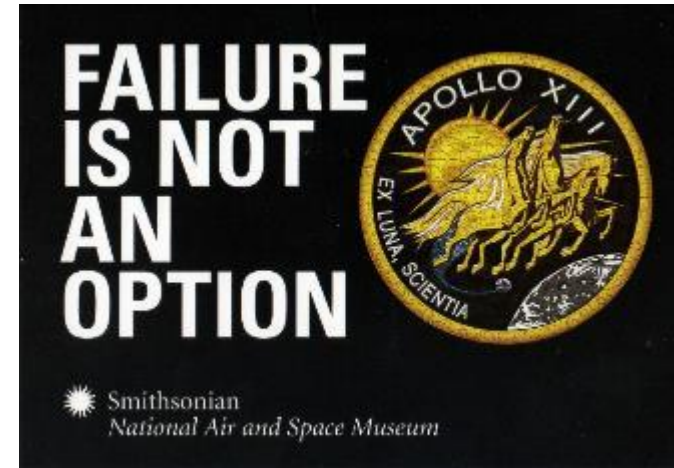
- Back office;
- Central system;
- Customer service network;
- Road side equipment and OBU (DarsGo unit);
- Enforcement system.



# Establishing the DarsGo system

- Large complex project:
  - Road Side Equipment Construction
  - IT implementation: HW, SW
  - DARS internal reorganization
- Start of Implementation:
  - September 2016
- Start of Operation:
  - 1<sup>st</sup> April 2018
- Switching from an existing system to the DarsGo system
  - one-off, irreversible with no parallel operation of the old system
  - Revenue must be the same or higher

DARS



# Informing Customers before Go-Live

DARS

- **Emails to customers**, chambers of commerce, professional associations, embassies - several rounds
- „**Sales team**“ – instructors – visits, calls, emails, prepare data for registration
- **Distribution of leaflets** at tool booths, on parking places last three days before the start
- Presentations to chamber of commerce and embassies, at professional events and conferences
- Animated videos of basic information and procedures, Viral video
- Articles in professional magazines
- Advertising on back doors of trailers, on motorway overpasses
- Advertising in printed and digital media
- Advertising on national and regional radio stations
- Mounting of signalization informing HGV drivers of DarsGo system in neighboring countries





# Go-Live 1.4.2018

- the old system was stopped at 00:00
- the first toll transaction at 00:00:00.202 (202 milliseconds after midnight)
- the first enforcement case was detected and penalty issued to the violator half an hour past midnight.
- no congestions on any toll road, including border crossings.

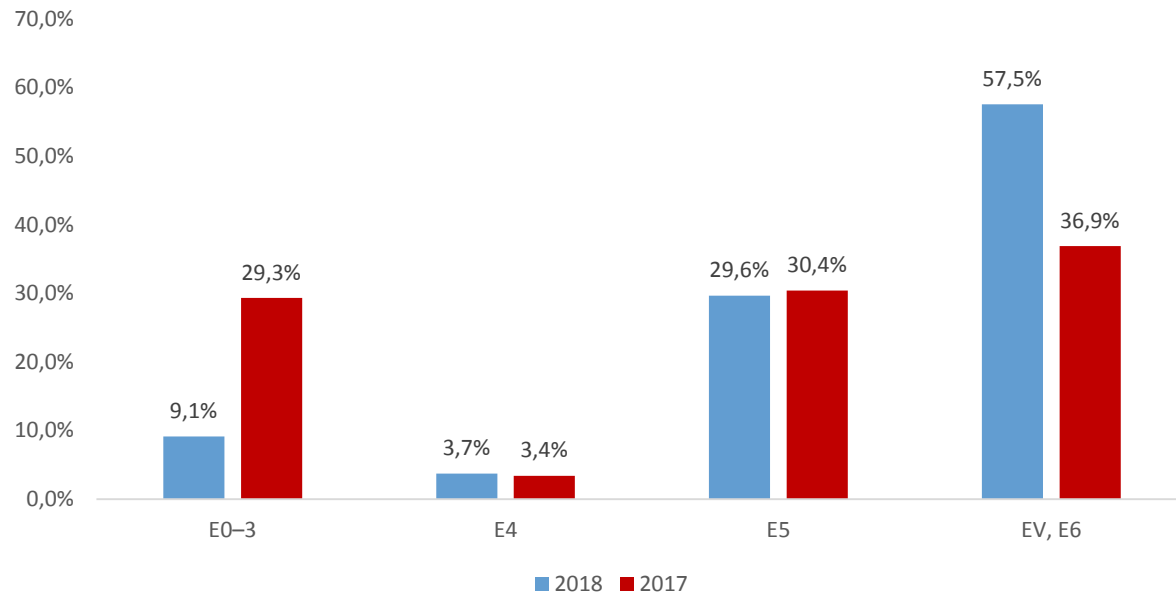


# DarsGo Toll Revenue

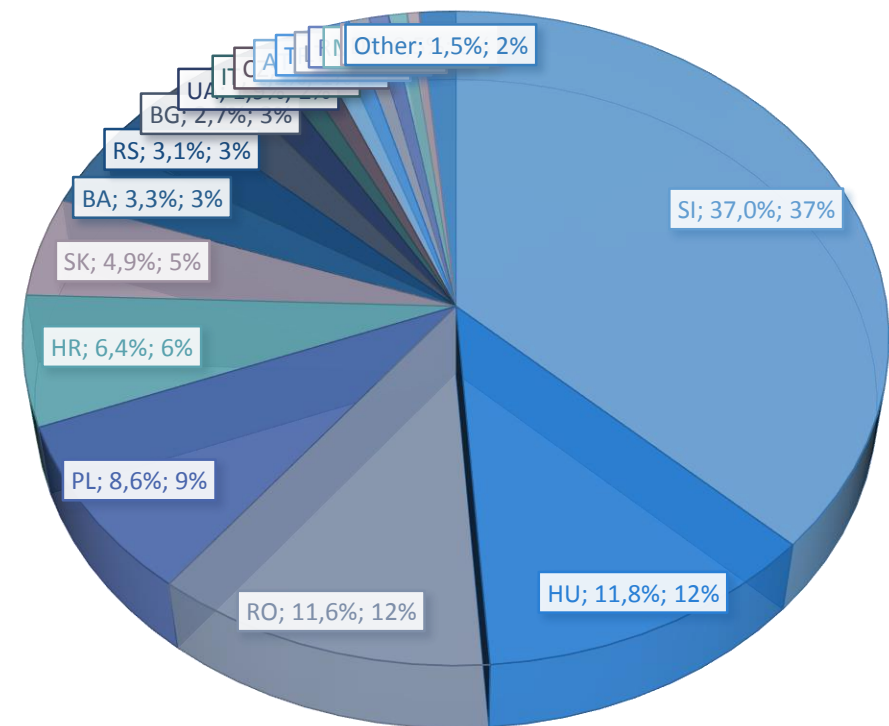


■ 2017/2018 +4,99 %

Toll Revenue by EURO Emission Class



TOLL REVENUE BY COUNTRY



# Fuel Savings Estimation

- Dismanteling of 34 tollbooths
- Estimated savings in free flow DarsGo system
  - 2018:
    - fuel saved: **18.000 tons**
    - less CO2 emissions : **8055 tons**
  - 2020:
    - fuel saved: **21.200 tons**
    - less CO2 emissions : **9482 tons**



# Toll Categories in DarsGo System

- **The toll rate for each toll section depends on:**
  - the vehicle type or vehicle toll-rate category, the EURO emission class, and
  - the distance driven.
- **Toll rate categories**
  - R3 first toll rate category - Motor vehicles having two or three axles whose maximum permissible weight exceeds 3,500 kg
  - R4 second toll rate category - Motor vehicles having more than three axles whose maximum permissible weight exceeds 3,500 kg
- **Exemption:** The Karavanke tunnel – toll tariffs do not differ based on the EURO emission class.



# The Toll Rate Structure

- Toll rate structure :
  - Infrastructure cost
  - External cost (air, noise) – prepared not implemented
  - **Mark-up from 1.1.2019,**
    - 15% or 5% of the weighted average infrastructure charge
    - 36 sections, Koper – Ljubljana 15%, Ljubljana – Šentrupert 5%
    - funds collected are a dedicated revenue of the Republic of Slovenia and will be used exclusively for the construction of the second railway track Divača-Koper.
- The infrastructure price per kilometer in EUR without VAT:
  - R3: 0,205940 €
  - R4: 0,428356 €
- The adjustment factors for toll rates for vehicles of the EURO emission class:
  - EURO IV: 0,80
  - EURO V: 0,70
  - EURO EEV, VI: **0,60**
- Defined distances for each toll section
- The toll in the toll price list is set in euros excluding value added tax. A 22% VAT is added to the toll charged to the customers.

# DarsGo: Enforcement

- The enforcement process encompasses detection and prosecution;
  - Detection → Fixed installations, i.e. gantries (15), classifications system, cameras, mobile enforcement vehicles (27);
  - Prosecution → Back office, mobile enforcement units.
- The most common violations:
  - wrongly declared number of axes (R3 pays 48% less than R4)
  - prepaid account has a negative balance
  - a vehicle without OBU (DarsGo Unit)
  - OBU from a different vehicle
  - wrongly declared EURO emission class (EURO 6 pays 40% less than EURO 0)
- 8375 penalties issued for HGV (April 2018 - February 2019)



# EURO Emission Class Declaration Process



- Users declare at customer service or at web portal EURO emission class.
- Scanned documents are attached to the registration data and stored in document management system.
- Documents and registration data are checked in the back office by a group of specialists.
  - Slovenian vehicles: declared EURO is checked in the national vehicle registration system
  - Non-Slovenian vehicles : scanned documents are visually checked
- In the case of an incorrect declaration, the difference in the toll is charged for all journeys in the past 3 months.





# Amending Directive 1999/62/EC



- The European Parliament proposed that zero-emission vehicles shall benefit from **infrastructure** charges reduced by **50 %** compared to the lowest rate. (75% in the Proposal for a Directive, 25 February 2019)
- External cost charging: from 1 January 2021, Member States that levy tolls shall apply an external-cost charge for traffic-based air or noise pollution to heavy duty vehicles and to vans intended for the carriage of goods on all parts of the network referred to in the Directive that are subject to an infrastructure charge.
- From 1 January 2026 onwards, an external-cost charge imposed on any section of the road network shall apply in a non-discriminatory manner to **all vehicle categories**.

(2017/0114(COD) - 25/10/2018 Text adopted by Parliament, 1st reading/single reading): The European Parliament adopted a legislative resolution on the proposal for a Directive of the European Parliament and of the Council amending Directive 1999/62/EC on the charging of heavy goods vehicles for the use of certain infrastructures.

# Blockchain: Shared, Verifiable Accounting



- Maersk and IBM, a blockchain-enabled shipping solution
  - Shippers, shipping lines, freight forwarders, port and terminal operators, inland transportation and customs authorities can interact more efficiently through real-time access to shipping data and shipping documents
  - Source: <https://newsroom.ibm.com/2018-08-09-Maersk-and-IBM-Introduce-TradeLens-Blockchain-Shipping-Solution>
- Milligan Partners and Ruuftop.io, a distributed ledger solution for toll interoperability.
  - Tolling.Network is a next-generation network for agency-to-agency national interoperability and cross-border interoperability.
  - Source: <https://www.prnewswire.com/news-releases/new-open-source-blockchain-system-for-toll-interoperability-300780974.html>
- Accenture, Microsoft, and Avanade, a blockchain-based identity system
  - ID2020 allows multiple parties such as hospitals, law enforcement, etc. to access the same data in a highly secure manner.
  - Source: <https://www.accenture.com/us-en/insight-blockchain-id2020>
- The vehicle's digital twin on a blockchain-based system
  - Group Renault is experimenting with storing the digital twin of its vehicles on a blockchain-based system which would provide a single source of truth for each vehicle's maintenance data.
  - Source: <https://www.logistics.dhl/content/dam/dhl/global/core/documents/pdf/glo-core-blockchain-trend-report.pdf>

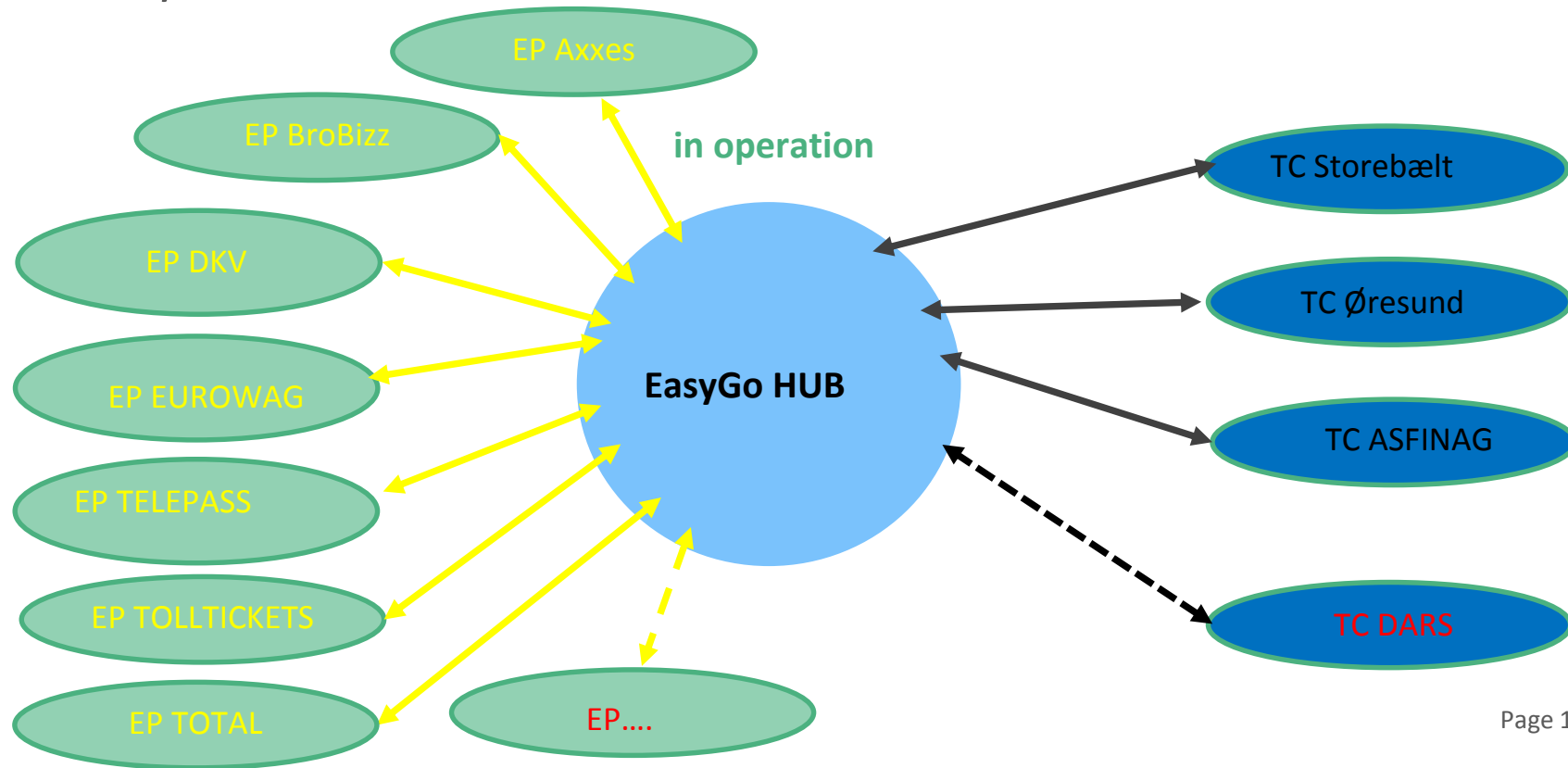
# Implementation of EETS in DarsGo system

## ■ Frontend:

- Use of system compliant EETS OBUs

## ■ Backend:

- Use of the Easy Go Hub



# Implementation of the Interoperability

- DARS d.d. is an associate member of the EasyGo Consortium – February 2018
- EETS Domain Statement published on 1.4.2018
- Invitation to interested EETS providers - 20.4.2018
- Informative meeting with interested bidders - 16.5.2018
- Signature of NDA with bidders - July 2018
- The application for inclusion was sent by: W.A.G payment solutions, a.s., tolltickets GmbH, DKV Euro Service GmbH, Axxes, Telepass S.p.A., BroBizz A / S., TOTAL
- For the first phase of the testing the following were selected: DKV Euro Service GmbH, Axxes, Telepass S.p.A., BroBizz A / S
- The offered commercial terms (fee per transaction, cost of testing and maintenance, refunds for OBU) were not accepted
- A new proposal, contract and general terms and conditions are being prepared to be sent to selected providers in the coming weeks.
- EasyGo implementation is in progress.
- Anticipated start of tests in May 2019, start of the pilot operation at the end of 2019.



Thank you  
for your attention.

Matej Kranjc

*Project Director*

DARS d.d.

[matej.kranjc@dars.si](mailto:matej.kranjc@dars.si)

[www.dars.si](http://www.dars.si)